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RESEARCH ARTICLE

Does comorbidity matter in body-focused repetitive behavior disorders?

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BACKGROUND: Trichotillomania (TTM) and skin-picking disorder (SPD) have been characterized as body-focused repetitive behavior disorders (BFRBs). Because BFRBs frequently co-occur, we sought to discover the similarities and differences for individuals having both TTM and SPD as opposed to 1 of these disorders.

METHODS: Participants with primary TTM (N = 421) were evaluated regarding the comorbidity of SPD, and participants with primary SPD (N = 124) were evaluated regarding the comorbidity of TTM. The effects of comorbidity overlap on demographic and clinical measures were evaluated.

RESULTS: Of the 421 participants with primary TTM, 61 (14.5%) had co-occurring SPD. Of 124 participants with primary SPD, 21 (16.9%) had comorbid TTM. Participants with primary TTM and comorbid SPD had significantly more severe trichotillomania symptoms and were more likely to have major depressive disorder than those with TTM alone. Participants with primary SPD and comorbid TTM reported significantly more severe skin-picking symptoms than those who had only SPD.

CONCLUSIONS: Individuals with co-occurring TTM and SPD may have more problematic symptoms with the primary repetitive behavior. Hair pullers with comorbid SPD were more likely to have comorbid depression. Evaluating patients for multiple BFRBs may be important to assess the severity of symptoms and may have treatment implications.

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INTRODUCTION

Trichotillomania (TTM) and skin-picking disorder (SPD) both have been characterized as body-focused repetitive behavior disorders (BFRBs).[1-4] Their suggested grouping as BFRBs arises from parallel and common features: both disorders occur more frequently among women,[5] involve an uncontrolled repetitive behavior of excessively grooming oneself,[2] and appear to share some genetic and neurobiological overlap.[6-8]

TTM and SPD frequently co-occur.[3,9,10] In terms of clinical presentation, some preliminary research suggests that individuals with co-occurring TTM and SPD spend more time engaging in pulling or picking behavior each day compared with patients with TTM alone.[11] In addition, self-reported data from TTM patients with comorbid BFRBs also illustrate greater "focused" pulling and perceived disability, compared with non-comorbid cases.[3]

Although our clinical understanding of the impact of TTM and SPD comorbidity remains limited, more extensive research is available exploring relationships between other so-termed obsessive-compulsive and related disorders (OCRDs). The category of OCRDs, now recognized in DSM-5, includes obsessive-compulsive disorder (OCD), body dysmorphic disorder (BDD), and hoarding disorder, alongside TTM and SPD. For example, adults with OCD and comorbid BDD demonstrate greater OCD symptom severity, earlier age at onset of OCD, as well as higher rates of co-occurring depression and anxiety compared with those with OCD alone.[12] Similarly, BDD patients with comorbid OCD demonstrate greater severity of BDD[13] but no significant differences in age at onset compared with those with BDD alone.[14] Hoarding disorder, a new disorder for DSM-5, has received less attention. Collectively, the available studies—mostly in OCD—indicate a possible synergistic effect in terms of symptom severity in individuals with multiple OCRDs.[1]

Given the clinical significance of recognizing comorbidity among OCRDs, the aim of the current study was to examine whether having co-occurring TTM and SPD is associated with greater symptom severity, rates of psychiatric comorbidities, and psychosocial dysfunction than having either TTM or SPD alone.

METHODS

Participants

Data from 421 participants with primary TTM (398 [94.5%] females; mean age, 28.9 ± 11.6 years) who participated in treatment and nontreatment studies from 2006 to 2016 from the University of Chicago, University of Minnesota, and Massachusetts General Hospital were included in this study. Additionally, 124 participants with primary SPD (109 [87.9%] females; mean age, 33.9 ± 11.7 years) from the University of Chicago and the University of Minnesota who participated in treatment and nontreatment studies between 2005 to 2016 were included. Study procedures were carried out in accordance with guidelines detailed in the latest version of the Declaration of Helsinki. The institutional review boards at the University of Chicago, University of Minnesota, and Massachusetts General Hospital approved the studies and sharing of data, and all participants provided written, voluntary informed consent. Data were de-identified according to the Safe Harbor method for de-identification prior to data sharing (§164.514[b]).[15]

All participants had a current DSM-IV or DSM-5 primary diagnosis of TTM or SPD[16,17] and were age 13 to 65. Exclusion criteria at the University of Chicago and the University of Minnesota included current pregnancy, diagnosis of bipolar disorder or psychosis, and inability to provide written consent for participation. Exclusion criteria at Massachusetts General Hospital included a lifetime diagnosis of psychosis, autism, or intellectual disability. All participants underwent a detailed psychiatric evaluation using the Structured Clinical Interview for DSM-IV (SCID).[18] Current attention-deficit/hyperactivity disorder (ADHD) was assessed at the University of Chicago and the University of Minnesota by the participant reporting a previous diagnosis by a psychologist or psychiatrist, and determined at Massachusetts General Hospital using the Kiddie-Sads-Present and Lifetime Version (K-SADS) ADHD module.

Assessments

All participants were asked about their hair-pulling and skin-picking behaviors, and this included questions regarding age at onset and duration of illness. For participants seen prior to the introduction of DSM-5 in 2013, SPD was

TABLE 1
Primary BFRB alone compared with co-occurring BFRBs on demographic variables

Primary TTM alone compared with primary TTM and comorbid SPD					
Variable	**TTM (n = 360)**	**TTM + SPD (n = 61)**	**Statistic**	***P***	**Cohen's *d***
Sex, n (% female)	340 (94.4%)	58 (95.1%)	0.041[a]	.839	—
Age, years	28.45 (11.6)	31.79 (11.5)	5376.5	.011	.281
Marital status (% single) n = 353, 57	249 (70.5%)	30 (52.6%)	8.506[a]	.075	—
Education, n (%), n = 300, 53			1.943[a]	.746	—
High school or less	81 (27.0%)	10 (18.9%)			
Some college	33 (11.0%)	6 (11.3%)			
College degree or more	186 (62.0%)	37 (69.8%)			
Race (% white), n = 355, 57	325 (91.6%)	54 (94.7%)	3.346[a]	.502	—
Primary SPD alone compared to primary SPD and comorbid TTM					
Variable	**SPD (n = 103)**	**SPD + TTM (n = 21)**	**Statistic**	***P***	**Cohen's *d***
Sex, n (% female)	91 (88.4%)	18 (85.7%)	0.114[a]	.736	—
Age, years	33.1 (11.4)	38.0 (12.2)	816.5	.077	—
Marital status, n (% single)	55 (53.4%)	10 (47.6%)	0.761[a]	.859	—
Education, n (%), n = 101, 20			2.566[a]	.767	—
High school or less	6 (5.9%)	0 (0%)			
Some college	30 (29.7%)	7 (35.0%)			
College degree or more	65 (64.4%)	13 (65.0%)			
Race (% white), n = 101, 19	85 (84.2%)	18 (94.7%)	4.782[a]	.443	—

Note: Mean (SD) unless indicated otherwise; numbers indicate adjusted sample sizes based on availability of data. All statistics are Mann-Whitney *U* unless indicated otherwise.

[a]Chi-square.

BFRB: body-focused repetitive behavior disorder; SD: standard deviation; SPD: skin-picking disorder; TTM: trichotillomania.

assessed using the Skin-Picking Diagnostic Inventory (N. J. Keuthen and S. E. Stewart, unpublished) or by the study doctor in a direct evaluation using SPD criteria as suggested by Arnold et al.[19] These criteria largely mirror those formalized in DSM-5.[17] SPD was diagnosed only if the subject displayed notable picking that resulted in skin lesions. TTM was diagnosed using the Trichotillomania Diagnostic Interview–Revised[20] or by the study doctor using DSM-IV or DSM-5 criteria, as appropriate, based on the year in which they were assessed.

The following disorder-specific measures were used:

- ***Massachusetts General Hospital Hairpulling Scale (MGH-HPS)***.[21] The MGH-HPS is a valid and reliable 7-item scale assessing hair-pulling behaviors, urges, control, and distress. Each item is scored on a 5-point scale from 0 (no symptoms) to 4 (severe symptoms). Total scores range from 0 to 28.
- ***National Institute of Mental Health Trichotillomania Severity Scale (NIMH-TSS)***.[22] The NIMH-TSS is a valid and reliable scale that asks about hair-pulling behaviors in the past week and the previous day, the ability to resist the urge to pull hair, distress associated with hair pulling, and interference with daily life due to hair pulling.
- ***Skin Picking Symptom Assessment Scale (SP-SAS)***.[9] The SP-SAS is a valid and reliable 12-question scale measuring skin-picking behaviors, thoughts, urges, control, and distress in the past week. The questions are assessed using a 5-point scale, from 0 (none) to 4 (extreme).
- ***Yale-Brown Obsessive Compulsive Scale Modified for Neurotic Excoriation (YBOCS-NE)***.[9,19] The YBOCS-NE is a valid and reliable modified version of the YBOCS for SPD assessing skin picking in the past week. It has 2 subsections: urges and behaviors. Scores range from 0 to 40, with higher scores reflective of more severe skin-picking symptoms.

General measures of symptom severity and psychosocial functioning also were used:

TABLE 2
Primary TTM compared with primary TTM with comorbid SPD: Clinical variables and comorbidities

Variable	TTM (n = 360)	TTM + SPD (n = 61)	Statistic	*P*	Cohen's *d*
Age at onset, years, n = 350, 60	12.5 (5.8)	11.7 (5.4)	9387.5	.188	—
Duration of TTM, years, n = 350, 60	16.0 (11.96)	20.1 (11.5)	8041.5	.004	0.353
MGH-HPS total, n = 306, 57	15.6 (4.8)	17.4 (4.2)	6659.0	.004	0.393
NIMH-TSS total, n = 337, 40	10.7 (4.0)	12.1 (4.36)	5376.5	.036	0.359
SDS total, n = 270, 53	9.9 (5.7)	10.8 (7.5)	6835.0	.606	—
Current depression, n (%)	63 (17.5%)	21 (34.4%)	9.357[a]	.002	0.305 Phi (Φ)
Current anxiety, n (%), n = 358, 60	92 (25.7%)	19 (31.7%)	0.939[a]	.333	—
Current ADHD, n (%), n = 358, 60	27 (7.5%)	5 (8.3%)	0.150[a]	.698	—
Current BDD, n (%), n = 311, 56	5 (1.6%)	3 (5.4%)	3.129[a]	.077	—
Any current comorbidity other than BFRB, n (%)	185 (51.4%)	38 (62.3%)	2.491[a]	.115	—

Note: Mean (SD) unless indicated otherwise; numbers indicate adjusted sample sizes based on availability of data. All statistics are Mann-Whitney *U* unless indicated otherwise.

[a]Chi-square.

ADHD: attention-deficit/hyperactivity disorder; BDD: body dysmorphic disorder; BFRB: body-focused repetitive behavior disorder; MGH-HPS: Massachusetts General Hospital Hairpulling Scale; NIMH-TSS: National Institute of Mental Health Trichotillomania Severity Scale; SD: standard deviation; SDS: Sheehan Disability Scale; SPD: skin-picking disorder; TTM: trichotillomania.

• ***Clinical Global Impression–Severity scale (CGI-S)***.[23] The CGI-S assesses overall symptom severity using a scale that ranges from 1 (not ill at all) to 7 (among the most severe of cases).

• ***Sheehan Disability Scale (SDS)***.[24] The SDS evaluates psychosocial dysfunction in 3 domains: work/school, social life, and home/family life.

Data analysis

For purposes of this analysis, participants were grouped into 1 of the following 4 groups based on their mental health evaluation: (1) primary TTM, (2) primary TTM with comorbid SPD, (3) primary SPD, and (4) primary SPD with comorbid TTM. In order to determine which variables were normally distributed, we used the Kolmogorov-Smirnov test. For variables that were not normally distributed, the Mann-Whitney *U* test was used to determine differences between the groups. For normally distributed variables, an analysis of variance was used. The chi-square test was used for nonparametric categorical variables. Significance was defined as $P < .05$. Effect sizes also were calculated. Effect sizes for the equality of sets of mean differences between groups are reported in terms of Cohen's effect size index (*d*) or, for chi-square analyses, the effect sizes are Phi (Φ). A *d* of 0.2 was considered a small effect size; 0.5, medium; and 0.8, large. Phi (Φ) of 0.1 was considered a small effect size; 0.2, medium; and 0.3, large. SPSS version 22.0 (IBM Corp) was used for all analyses.

RESULTS

In participants with primary TTM, 61 of 421 (14.5%) cases had comorbid SPD. In participants with primary SPD, 21 of 124 (16.9%) cases had comorbid TTM.

The participants with primary TTM were significantly younger than those with primary TTM and comorbid SPD. There were no other significant demographic findings (**TABLE 1**).

In terms of clinical variables, those with primary TTM and comorbid SPD vs stand-alone primary TTM had a longer duration of illness (defined as time between first TTM symptoms and assessment for this study, $P = .004$), greater TTM symptom severity (reflected by higher total scores on the MGH-HPS, $P = .004$; and higher NIMH-TSS scores, $P = .036$), and were more likely to have current comorbid depression (34.4% vs 17.5%, $P = .002$) (**TABLE 2**).

Those participants with primary SPD and comorbid TTM, vs stand-alone primary SPD, reported significantly later age of SPD onset ($P = .027$) and greater skin-picking symptom severity (reflected by the total SP-SAS score, $P = .047$; and the CGI-S, $P = .026$) (**TABLE 3**).

TABLE 3
Primary SPD compared with primary SPD with comorbid TTM: Clinical variables and comorbidities

Variable	SPD (n = 103)	SPD + TTM (n = 21)	Statistic	*P*	Cohen's *d*
Age at onset, years	11.8 (7.0)	18.6 (14.8)	743.0	.027	0.585
Duration of TTM, years	21.29 (12.2)	19.43 (13.6)	986.5	.570	—
SP-SAS total, n = 102, 21	28.20 (6.6)	31.38 (6.8)	4.03[a]	.047	0.477
NE-YBOCS total	18.40 (4.9)	20.19 (5.9)	899.0	.223	—
CGI-S	4.22 (0.9)	4.62 (0.7)	789.5	.026	0.510
SDS total	11.32 (6.7)	11.81 (6.7)	0.094	.760	—
Current depression, n (%)	37 (35.9%)	8 (38.1%)	0.036[b]	.850	—
Current anxiety, n (%)	18 (17.5%)	5 (23.8%)	0.463[b]	.496	—
Current ADHD, n (%)	6 (5.8%)	3 (14.3%)	1.855[b]	.173	—
Current BDD, n (%), n = 54, 9	12 (22.2%)	4 (44.4%)	2.011[b]	.156	—
Any current comorbidity other than a BFRB, n (%)	55 (53.4%)	13 (61.9%)	0.510[b]	.475	—

Note: Mean (SD) unless indicated otherwise; numbers indicate adjusted sample sizes based on availability of data. All statistics are Mann-Whitney *U* unless indicated otherwise.

[a]ANOVA.
[b]Chi-square.

ADHD: attention-deficit/hyperactivity disorder; ANOVA: analysis of variance; BDD: body dysmorphic disorder; BFRB: body-focused repetitive behavior disorder; CGI-S: Clinical Global Impression–Severity of Illness scale; NE-YBOCS: Yale-Brown Obsessive Compulsive Scale Modified for Neurotic Excoriation; SD: standard deviation; SDS: Sheehan Disability Scale; SPD: skin-picking disorder; SP-SAS: Skin Picking Symptom Assessment Scale; TTM: trichotillomania.

DISCUSSION

This study examined the clinical significance of having co-occurring BFRBs in the largest sample of clinically diagnosed adults with these disorders available to date. As predicted, BFRB symptom severity was greater in those with co-occurring TTM and SPD compared with those with either TTM or SPD alone. This finding is consistent with similar analyses in related disorders of OCD and BDD,[12,13] supporting the importance of careful screening for comorbidity in clinical practice.

The comorbid BFRB groups evidenced greater symptom severity than the other 2 groups (small effect size), and comorbidity of BFRBs may suggest greater dysfunction of underlying neurocircuitry. Neuroimaging research in both TTM and SPD suggest abnormally reduced integrity of white-matter tracts and structural abnormalities in neural regions involved in motor generation and suppression (such as the anterior cingulate and frontal cortices), while functional imaging has illustrated executive planning and motor inhibitory deficits, compared with healthy controls.[6,7,25-28] It is possible, therefore, that the combination of 2 similar disorders may result in additive abnormalities or even disproportionately greater than expected structural abnormalities in regions involved in habit generation, action monitoring, and top-down inhibitory control processes. Future neuroimaging research should consider comparing individuals with a single BFRB to those with co-occurring BFRBs to fully understand the biological substrates of this comorbidity. It also would be valuable in future work to compare cognitive functioning between such groups.

From a clinical perspective, the finding of greater BFRB symptom severity in the comorbid groups also may necessitate changes to current treatment approaches. Given that cognitive-behavioral strategies, specifically variants of habit reversal therapy, have shown benefit for both TTM and SPD separately,[29,30] the question remains as to whether interventions need to be more frequent, longer in duration, or different when approaching individuals with comorbid TTM and SPD. Also relevant to clinical practice is that people with primary TTM who had comorbid SPD showed significantly higher rates of major depressive disorder than people with TTM alone (medium effect size). Although this cross-sectional study cannot assess causality, it appears likely that having these 2 BRFBs predisposes toward high risk of later developing depression, rather than vice versa.

There are several limitations to the current study. First, the comorbid BFRB was not examined with its own sever-

ity measure. It could be potentially informative for future research to better understand how the level of severity of the comorbid BFRB impacts the primary BFRB. Second, the samples, although large, lacked ethnic and gender diversity. Third, it should be noted that the primary TTM with co-occurring SPD group, who were more likely to have depression, also were older, and so this finding needs to be interpreted with this limitation. How these findings might generalize to other populations remains to be explored. Lastly, it would be valuable in future work to examine cognitive and neurobiological correlates of comorbid BFRBs, as opposed to stand-alone disorders, as the current study did not collect such data.

CONCLUSIONS

This study suggests that the co-occurrence of TTM and SPD results in more problematic symptoms with the primary repetitive behavior. In addition, this study found that hair pullers with comorbid SPD were more likely to have depression. Evaluation of patients for multiple BFRBs may be important in assessing severity of symptoms and may have treatment implications. Whether and to what extent this co-occurrence necessitates novel treatment interventions awaits future research. ■

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